NOT MEASUREMENT SENSITIVE

MIL-STD-2525A
15 December 1996

SUPERSEDING
MIL-STD-2525 Version 1
30 September 1994

DEPARTMENT OF DEFENSE INTERFACE STANDARD

COMMON WARFIGHTING SYMBOLOGY

AMSC N/A AREA INST

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense. Using human factors engineering research, the standard is designed to eliminate conflicts within various symbol sets and to bring a core set of common warfighting symbology under one DOD standard. MIL-STD-2525A is designed to equip DOD with a standard solution that provides sets of C4I symbols, a coding scheme for symbol automation and information transfer, an information hierarchy and taxonomy, and technical details to support systems. The standard provides support through interoperability and users' input which is essential to ensure that the standard continues to meet the warfighters' requirements. MIL-STD-2525 is the primary reference that DOD uses to standardize warfighting symbology.

a. Standard symbology synthesized from land-based, nautical, and aeronautical warfighting domains is an increasingly essential ingredient in the successful implementation of the Command, Control, Communications, Computers, and Intelligence for the Warrior (C4IFTW) concept. Joint warfighting has strengthened the requirement for the rapid exchange of information by the C4I systems community, expanding into the weapons control or engagement domain.

b. Although this document is distributed in black and white, it was developed and is stored as a color document. Electronic versions can be printed in color if so desired. For further information, contact the address below.

2. Recommendations, additions, deletions and any pertinent data which may be of use in improving this document should be addressed to: Lead Standardization Activity (LSA), Center for Standards (CFS), ATTN: Information Directorate, Parkridge III, 10701 Parkridge Blvd, Reston, VA 20191-4357 by using the standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document to submit comments or by letter.

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APPENDIX

1. SCOPE

1.1 Scope. This standard provides common warfighting symbology along with details on its display and plotting to ensure the compatibility, and to the greatest extent possible, the interoperability of DOD Command, Control, Communications, Computer, and Intelligence (C4I) systems, development, operations, and training. The standard addresses the efficient transmission of symbology information within the infosphere through the use of a standard methodology for symbol hierarchy, information taxonomy, and symbol identifiers. The standard applies to both automated and hand-drawn graphic displays. These symbols are designed to enhance DOD's joint warfighting interoperability by providing a standard set of common C4I symbols. It is important to remember that the graphics of this document are not all inclusive, and other standards may apply. Additional symbol sets will be provided when this document is updated.

1.2 Purpose. This standard is designed to provide the guidelines and criteria necessary for the development and display of standard C4I warrior symbology. The requirement to standardize C4I warfighting symbology was recognized at the 30 August 1993 meeting of the Military Communications-Electronics Board (MCEB) in order to provide a family of symbology standards in support of the C4I for the Warrior (C4IFTW) concept. To satisfy these needs, common warfighting symbology standardization incorporates MIL-STD-2525A, *Common Warfighting Symbology*, a DOD symbol data repository, and supporting documentation such as the Symbology Information Technology Standards Management Plan (SITSMP), Configuration Management Plan, and Symbology Standards Management Committee (SSMC) charter (see figure 1).

1.3 Applicability. This standard applies to all DOD components directly or indirectly involved with C4I operations, system operations, system development, and training within the context of warfighting operations. MIL-STD-2525A will serve as the standard symbol set for all future DOD uses of C4I symbology. The standard can be applied to mapping/charting, weather, cockpit display, and engineering design symbology to the extent that it is usable by these communities. The standard will apply to all future use of symbols in two dimensional and electronic display systems in C4I environments.

a. MIL-STD-2525A combines the symbology from two separate usage domains, referred to as the "force domain" and the "engagement domain." These domains use warfighting symbology in support of their C4IFTW functions. When integrated, this symbology provides the basis for a final standard solution for C4IFTW symbology.

b. In the "force domain" environment, symbology has evolved from North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) 2019 (APP 6), "Military Symbols for Land Based Systems," and U.S. Army Field Manual (FM) 101-5-1/Marine Corp Reference Publication 5-2.2, *Operational Terms and Graphics*. Commanders and staff at all echelons use the

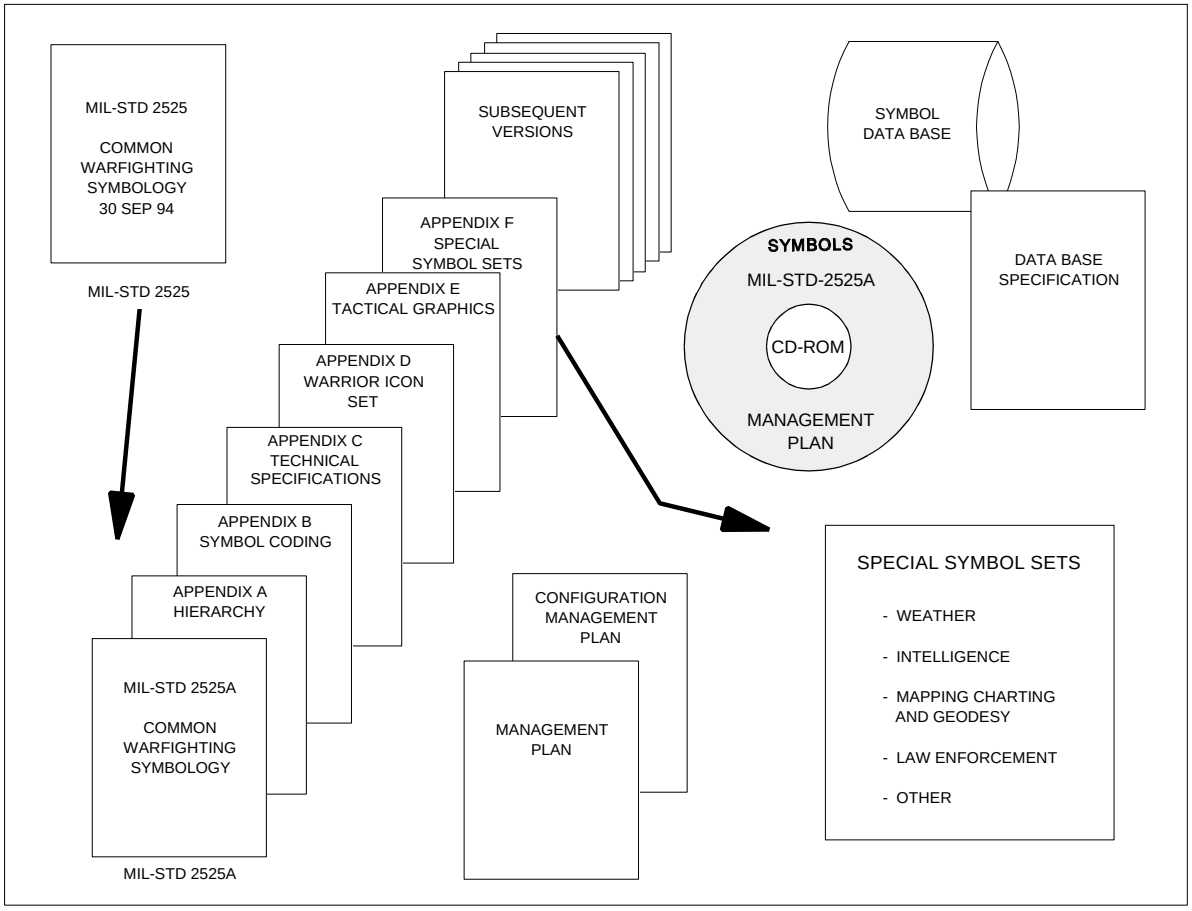


FIGURE 1. Common warfighting symbology documents.

symbols and graphics contained in these documents for planning and execution of ground force military operations. These symbols represent units, installations, and equipment and are used in automated C4I systems or to mark maps and overlays manually.

c. Symbology used in the "engagement domain" has evolved from the requirement to plot sea and air tracks on cockpit, radar, weapons control, and command and control tactical displays. Joint Tactical Information Distribution System (JTIDS) and Naval Tactical Data System (NTDS) symbology, and most recently , "Display Symbology and Colors for NATO Maritime Units," have been the primary sources for track symbols used within the "engagement domain".

d. In addition, MIL-STD-1295A and MIL-STD-1787B have been developed to provide standards guidance regarding rotary and fixed wing cockpit displays. MIL-STD-1776 is in draft for planned October 1997 release to supersede both MIL-STDs 1295A and 1787B. These documents

represent many years of work by the U.S. and international military communities and are representative of DOD requirements.

1.4 Content. MIL-STD-2525A contains tables that provide the user with standard frames (geometric borders, see table I) and icons, along with guidelines for their use. Each of the warrior icons listed can be cross-referenced to the information hierarchy (taxonomy) and the symbol coding scheme, appendixes A and B respectively. The information hierarchy contained in appendix A provides an organization or structure for C4I warrior symbology which encompasses the tactical information commonly exchanged via symbology. Each symbol category and icon is given a number that is cross-referenced to a symbol code provided in appendix B. Also provided is a tactical graphics section (appendix E), which addresses lines, areas, points, fire support planning graphics, nuclear, biological, and chemical (NBC) symbology, and bearings. If common warfighting symbology (CWFS) is implemented to visually display or present symbology, the capability must comply with the provisions of this standard.

a. Symbols should comply with the National Imagery Transmission Format Standard (NITFS) when formed and disseminated. The NITFS implementation of the Computer Graphics Metafile (CGM), MIL-STD-2301, should be used for input interpretation and output generation of symbol representations. MIL-STD-2500 should be used for file formation and digital exchange of imagery, symbology, and other imagery-related products. The symbol coding scheme in MIL-STD-2525A is the preferred code for all symbol transmissions in the DOD. If necessary, the coding scheme may be translated at the user system; however, to ensure interoperability, a common code for warrior symbol constructs developed using CGM across joint interfaces is necessary and is made standard in this document. Transmission vehicles are being concurrently developed in the United States Message Text Format (USMTF) (GRAPHREP message) and Variable Message Format (VMF) communities.

b. Additional icons, refinement of the hierarchy, refinement of the coding scheme, and additional tactical graphics will be developed and presented in future updates of this standard. Special symbol sets will be released as they are developed.

1.5 Changes. MIL-STD-2525A is designed to be flexible enough to accommodate change and further development and input from the operators and users. Changes to these symbols and the addition of new symbol sets will be introduced through the procedures defined in the Symbology Configuration Management Plan, which mandates that changes will be approved by a consensus of the voting members of the Symbology Standards Management Committee (SSMC). The staffing of configuration management items, called change proposals, will be in accordance with the procedures provided in JIEO Plan 3200, *Information Technology Standards Management Plan*, and JIEO Plan 9002, *Symbology Information Technology Standards Management Plan.*

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and its supplement, cited in the solicitation.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-2500	-	National Imagery Transmission Format (Version 2.0) for the National Imagery Transmission Format Standard.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DOD Human Computer Interface (HCI)	-	Version 3.0
Joint Publication 1-02	-	Department of Defense Dictionary of Military and Associated Terms.
FM 34-3	-	Intelligence Analysis
STANAG 1241	-	NATO Standard Identity Description for Tactical Use

User Interface Specification for the Defense Information Infrastructure (DII) - Version 2.0

(Joint Publications are available from the Joint Staff, Washington, DC 20318-7000.)

2.3 Non-Government publications. None referenced.

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Acronyms used in this standard. The acronyms used in this standard are defined as follows:

AA	Assembly Area
A/C	Aircraft
AAM	Air-to-Air Missile
AAWC	Antiair Warfare Commander
ACA	Airspace Coordination Area
ACP	Air Control Point
ACV	Armored Combat Vehicle
AD	Air Defense
ADP	Automated Data Processing
AEW	Airborne Electronic Warfare
AEW	Airborne Early Warning
AF	Air Force
AGI	Auxilliary Group Intelligence
ANM	Acoustic Noise Monitor
APC	Armored Personnel Carrier
APOD	Aerial Port of Debarkation
APOE	Aerial Port of Embarkation
APP	Allied Procedures Publication
ASM	Antiship Missile
ASP	Ammunition Support Point
ASR	Alternate Supply Route
ASUW	Antisurface Warfare
ASW	Antisubmarine Warfare
ATAC	Air Transportable Acoustic Communications
BT	Bathythermograph
BSA	Brigade Support Area
C/S/A	CINC, Service, and Agency
C2	Command and Control
C3I	Command, Control, Communications, and Intelligence
C4I	Command, Control, Communications, Computers, and Intelligence
C4IFTW	C4I for the Warrior
CAP	Combat Air Patrol
CARP	Computed Air Release Point
CAS	Close Air Support
CASS	Command Activated Sonobuoy System
CATK	Counterattack
CCP	Communication Check Point
CFA	Covering Force Area

CFL	Coordinated Fire Line
CGM	Computer Graphics Metafile
CID	Criminal Investigation Division
CIE	Commission Internationale de l'Eclairage
CINC	Commander in Chief
COLT	Combat Observation and Lasing Team
COMMZ	Communications Zone
CP	Check Point
CSAR	Combat Search and Rescue
DCA	Defensive Counter Air
DGZ	Designated Ground Zero
DIA	Defense Intelligence Agency
DICASS	Directional Command Activated Sonobuoy System
DIFAR	Directional Frequency Analysis and Recording
DISA	Defense Information Systems Agency
DLIC	Detachment Left-in-Contact
DLRP	Data Link Reference Point
DOD	Department of Defense
DODISS	Department of Defense Index of Specifications and Standards
DRPR	Drawing Practices
DTG	Date-Time Group
EA	Electronic Attack
EC	Electronic Combat
EO	Electro-optical
EP	Electronic Protection
EPW	Enemy Prisoner of War
ERP	Engineer Regulating Point
ES	Electronic Warfare Support
EW	Electronic Warfare
EZ	Extraction Zone
F/W	Fixed Wing
FAADEZ	Forward Area Air Defense Zone
FC	Fire Control
FCZ	Forward Combat Zone
FEBA	Forward Edge of the Battle Area
FLB	Forward Logistics Base
FLET	Forward Line of Enemy Troops
FLOT	Forward Line of Own Troops
FM	Field Manual
FO	Frame Optional
FSCL	Fire Support Coordination Line
GPS	Global Positioning System

GSD	Graphical Situation Display
GZ	Ground Zero
HCI	Human Computer Interface
HFAC	Human Factors
HIDACZ	High-Density Airspace Control Zone
HL	Holding Line
H/MAD	High/Medium Altitude Air Defense
ICBM	Intercontinental Ballistic Missile
IFF	Identification, Friend or Foe
IFV	Infantry Fighting Vehicle
INST	Information Standards and Technology
IP	Initial Point
IRBM	Intermediate Range Ballistic Missile
ISB	Intermediate Staging Base
JAG	Judge Advocate General
JTIDS	Joint Tactical Information Distribution System
JPOTF	Joint Psychological Operations Task Force
JSEAD	Joint Suppression of Enemy Air Defenses
JSOTF	Joint Special Operations Task Force
LAB	Logistics Assault Base
LC	Line of Contact
LCCP	Large Communication Configured Package
LD	Line of Departure
LLLTV	Low-Light Level Television
LLTR	Low-Level Transit Route
LOA	Limit of Advance
LOC	Lines of Communications
LOFAR	Low Frequency Analysis and Recording
LOTS	Logistics Over-The-Shore
LP	Linkup Point
LRP	Logistics Release Point
LRS	Long Range Surveillance
MAGTF	Marine Air-Ground Task Force
MBA	Main Battle Area
MC&G	Mapping, Charting, and Geodesy
MCM	Mine Countermeasures
MEDEVAC	Medical Evacuation
MEZ	Missile Engagement Zone
MICV	Mechanized Infantry Combat Vehicle
MOOTW	Military Operations Other Than War
MP	Military Police
MPA	Maritime Patrol Aircraft

MRR	Minimum-Risk Route
MSD	Minimum Safe Distance
MSR	Main Supply Route
MTF	Medical Treatment Facility
NAI	Named Area of Interest
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and Chemical
NFA	No-Fire Area
NFL	No-Fire Line
NIMA	National Imagery and Mapping Agency
NITFS	National Imagery Transmission Format Standard
NOTAM	Notice to Airmen
NTDS	Naval Tactical Data System
OBJ	Objective
OP	Observation Point; Observation Post
PAA	Position Area for Artillery
PDF	Principal Direction of Fire
PIM	Path of Intended Motion
PLD	Probable Line of Deployment
POD	Port of Debarkation
POE	Port of Embarkation
PP	Passage Point
PS	Personnel Services
PZ	Pickup Zone
QSTAG	Quadripartite Standardization Agreement
R3P	Rearm, Refuel, and Resupply Point
RAA	Rear Assembly Area
RAOC	Rear Area Operation Center
RCZ	Rear Combat Zone
RES	Reserve
RFL	Restrictive Fire Line
RGB	Red, Green, Blue
RL	Report Line
RO	Range Only
RO/RO	Roll-on/Roll-Off
ROZ	Restricted Operations Zone
RP	Release Point
RPV	Remotely Piloted Vehicle
RV	Reentry Vehicle
S/SSM	Surface-to-Subsurface Missile
SAAFR	Standard use Army Aircraft Flight Route
SAM	Surface-to-Air Missile

SAR	Search and Rescue
SFOB	Special Forces Operations Base
SIF	Selective Identification Feature
SIGINT	Signals Intelligence
SL	Start Line
SLBM	Sea-Launched Ballistic Missile
SOF	Special Operations Forces
SP	Starting Point
SP	Self-Propelled
SP	Strong Point
SPOD	Seaport of Debarkation
SPOE	Seaport of Embarkation
SSM	Surface-to-Surface Missile
SSMC	Symbology Standards Management Committee
STANAG	Standardization Agreement (NATO)
SWG	Symbology Working Group
SWG	Surface Warfare Group
TAACOM	Theater Army Area Command
TAI	Target Area of Interest
TCP	Traffic Control Point
TF	Task Force
TGT	Target
TOT	Time on Target
TV	Television
TWS	Track While Scan
UAV	Unmanned Aerial Vehicle
UF	Unframed
USA	United States Army
UWT	Under Water Telephone
UWTG	Under Water Tug
VLAD	Vertical Line Array Difar
V/STOL	Vertical/ Short Take Off and Landing
WFZ	Weapons Free Zone

3.2 Definitions used in this standard. Terms used in this document are defined as follows. The source of the definition is cited in parentheses.

a. Assumed friend - A track or contact which is assumed to be a friend because of its characteristics, behavior, or origin. (STANAG 1241)

b. Attribute - A distinctive feature or characteristic such as line, shape, color, texture (fill), edge, mass, and value.

c. Battlespace - A warrior's battlespace is the total, fluid, dynamic environment within which mission-derived operational objectives are pursued.

d. C4IFTW - A vision or concept that when implemented, provides the warrior at any time and place with a fused, real-time, true representation of the warrior's battlespace.

e. Chromaticity - The aspect of color including the consideration of its dominant wavelength and purity.

f. Commission Internationale de l'Eclairage (CIE) - A color space chart widely used to describe the range of color seen by the human eye.

g. Contact - In air intercept, a term meaning, "Unit has an unevaluated target." (Joint Pub 1-02)

h. Engagement domain - An environment that primarily is based on the command and control of weapons systems and designed to facilitate rapid identification and judgment based on the need to engage or not to engage.

i. Engineering design symbology - Symbology used to design, plan, and develop engineering drawings in the chemical, electrical, civil, mechanical, and structural engineering fields.

j. Faker - A friendly aircraft simulating a hostile in an air defense exercise. (Joint Pub 1-02)

k. Fields - A defined area in which a limited combination of alphanumeric and other characters, indicators, and/or abbreviations are grouped/situated in an established way around a symbol/icon, line, area, point, or boundary and used for the purpose of providing additional information about the associated object or battlespace geometry.

l. Footcandle - The unit of measure of illumination. The amount of light emitted by a standard candle measured one foot away from the candle.

m. Footlambert - The unit of measure of intensity of reflected or emitted light (luminance). The average luminescence of any reflecting surface in footlamberts is the product of the illumination in footcandles by the luminous reflectance of the surface.

n. Force domain - An environment that is primarily based on the command and control (management of the battlespace) of units and forces.

o. Frame - The geometric border of a symbol that provides an indication of the affiliation, battle dimension, and status of a warfighting object.

p. Friend - A track or contact belonging to a declared friendly nation. (STANAG 1241)

q. Graphic - All products of the cartographic and photogrammetric art.

r. Hostile - A contact positively identified as enemy. (Joint Pub 1-02)

s. Icon - The innermost part of a symbol that provides a graphic representation of a warfighting object.

t. Indicator - One of several specific graphical additions to a symbol used to provide additional information pictorially vice textually.

u. Interoperability - The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. (Joint Pub 1-02)

v. Joker - A friendly track or contact acting as a "suspect" track for exercise purposes only. (STANAG 1241)

w. MC&G symbology - Symbology that represents natural and man-made features used in the production or display of maps, charts, and digital geospatial information.

x. Meteorological symbology - Symbology used in weather/climatic forecasting.

y. Modifier - Optional text or graphics that provide additional information about a symbol or tactical graphic.

z. Neutral - A track or contact whose characteristics, behavior, origin, or nationality indicate that it is neither supporting nor opposing friendly forces. (STANAG 1241)

aa. Pending - A track or contact for which identification is to be determined. (STANAG 1241)

ab. Signals Intelligence (SIGINT) - 1. A category of intelligence comprising either individually or in combination all communications intelligence, electronics intelligence, and foreign instrumentation signals intelligence, however transmitted. 2. Intelligence derived from communications, electronics, and foreign instrumentation signals. Also called SIGINT. (Joint Pub 1-02)

ac. Staff - A straight line used as a headquarters indicator in field S and used to connect that symbol with its location on a map, chart, or display. The free end of the staff indicates

the location of the track or object.

ad. Status - A determination or declaration as to whether a track's or object's location or battlefield environment is existing/present or is planned/anticipated at the time that the symbology was generated or the time associated/presented with the symbology itself.

ae. Suspect - A track or contact which is potentially hostile because of its characteristics, behavior, origin, or nationality. (STANAG 1241)

af. Symbol - An object that presents information. (DOD Symbology Ad Hoc Working Group, 6 October 1994)

ag. Symbol ID code - An alphanumeric code based on a database structure that provides the minimum elements required to construct the basic icon and/or a complete symbol. (Joint Pub 1-02)

ah. Text - Words, alphanumeric information, and other ASCII characters used to define or further designate the meaning of a symbol.

ai. Track - A series of related contacts displayed on a plotting board. The actual path of an aircraft above, or a ship on, the surface of the earth.

aj. Unknown - 1. A code meaning information not available. 2. An unidentified target. An evaluated track or contact which has not been identified. (STANAG 1241)

ak. Warfighting symbology - Symbology used to plan and execute military operations in support of C4I functions.

4. GENERAL REQUIREMENTS

4.1 Objective. The display of warfighting symbology has evolved from a static, manual operation to include fully automated computer generation. This evolution has resulted in the fielding of many system-specific symbology implementations by the CINCs/Services/Agencies (C/S/As) to meet the mission requirements of the warfighter. The "C4I for the Warrior" concept, signed by the Chairman of the Joint Chiefs of Staff in June 1992, brings together C4I functions to provide the warfighter with a seamless, real-time, true representation of the battlespace. The standardization of warfighting symbology shall play an integral role in achieving interoperability during joint service operations. While the primary focus of this standardization is the electronic generation of symbology, this effort must also support those mission requirements where symbology is hand-drawn by the warfighter. In addition, this standard is designed so that all essential symbology information can be communicated to the warfighter on either a monochrome (i.e., black, white, or single color) or multicolor-capable display.

4.2 Organization. The purpose of warfighting symbology is to convey information about objects in the warfighter battlespace. This chapter defines the general requirements for the two types of warrior symbology: icon-based symbols and tactical graphics. This chapter also provides an overview of symbology modifiers and identifiers and addresses the use of alternative symbology sets.

4.3 Icon-based symbols. An icon-based symbol is composed of a frame (geometric border), fill, and icon, as shown in figure 2.

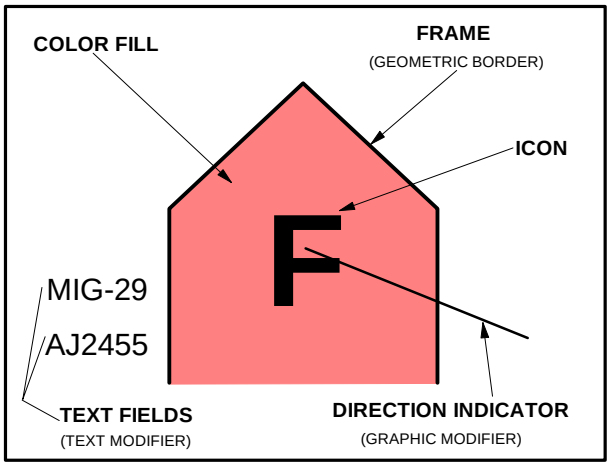


FIGURE 2. Symbol components.

4.3.1 Frame. The frame is the geometric border of a symbol which, when displayed, provides an indication of the affiliation, battle dimension, and status of a warfighting object. The frame is the border of the symbol and does not include associated material inside or outside of the border. The frame serves as the base to which other symbol components and modifiers are added. Though sometimes optional, in most instances, a frame surrounds an icon.

4.3.2 Fill. The fill is the interior area within a symbol. If the fill is assigned a color, it provides redundant information about the affiliation of the object. If color is not used, the fill is transparent.

4.3.3 Icon. The icon is the innermost part of a symbol which, when displayed, provides an abstract pictorial or alphanumeric representation of a warfighting object. The icon portrays the role or mission performed by the object. This standard distinguishes between icons that must be framed or unframed and icons where framing is optional. Information about framing is provided in paragraph 5.3.3 and appendix C; framing requirements for individual icons are presented in appendix D.

4.4 Tactical graphics. Tactical graphics provide operational information that cannot be presented via icon-based symbols alone. These graphics portray unit boundaries, special area designations, and other unique markings related to battlespace geometry and necessary for battlefield planning and management (see appendix E).

4.5 Symbol modifiers. A modifier is an optional text field or graphic indicator that provides additional information about the associated symbol or tactical graphic. This standard defines various types of modifiers and indicates where each is to be placed in relation to a symbol or tactical graphic, see 5.5.

4.6 Symbol ID code. A symbol ID code is an alphanumeric code that can be used to transfer the information required to generate and display symbols and tactical graphics. The coding scheme used in this identifier is explained in detail in appendix B.

4.7 Use of special symbol sets. While the symbology provided in this standard is intended to address the C4I information needs of the warfighter, it is expected that information from other operational domains will need to be displayed in order to accurately portray the battlespace. Many of these other domains have published symbology standards or other documents addressing information requirements that parallel the ones addressed here. Although these other domains are outside the scope of the current document, it is desirable to make the symbology that they publish available with the current document. As a result, appendix F contains symbology of potential interest to the users of the document. The content of this appendix is maintained by an operational community other than the SSMC and is not under configuration management by this group. The symbology included in appendix F is not harmonized with the current standard and may be inconsistent with the requirements concerning warfighting symbology presented here.

5. DETAILED REQUIREMENTS

5.1 Objective. To promote interoperability at the information level within the area of warfighting symbology, it is necessary to define a standard set of rules for symbol construction and generation to be implemented in C4I systems. The rules in this standard are considered to be the minimum necessary to ensure that information about warfighting symbology is exchanged successfully across service and organizational boundaries. These rules are not intended to direct any one system implementation or to constrain the manner in which the symbology is used.

5.2 Organization. This section provides the detailed requirements concerning symbology composition and display considered essential to achieve interoperability. Display rules are provided which allow the degree of complexity of the resulting symbology to be tailored to operational requirements and system capabilities. Additional implementation guidance is provided in appendix C.

5.3 Icon-based symbols. The components of an icon-based symbol provide information about the affiliation, battle dimension, status, and mission of a warfighting object.

5.3.1 Frame (geometric border). When a frame is included in a symbol, its shape shall indicate the affiliation, battle dimension, and status of the object being represented. Table II provides the approved frame shapes that present affiliation and battle dimension for warfighting symbology. A frame can be black or off-white depending on display background, or it can be colored, using the default colors in table C-II, to provide redundant information about affiliation. Information on display options is presented in paragraph 5.6.1 and appendix C.

5.3.1.1 Affiliation. Affiliation refers to the threat of the warfighting object being represented. The basic affiliation categories are unknown, friend, neutral, and hostile. A quatrafoil frame shall be used to denote unknown affiliation, a circle or rectangle frame to denote friend affiliation, a square frame to denote neutral affiliation, and a diamond frame to denote hostile affiliation. A question mark (?) in field E (see table I and figure 3a) or embedded within the frame (see table I) indicates the uncertainty of an object's identification and shall identify the symbol as assumed friend, suspect, or pending. The letter J or K in field E is used to accommodate special exercise requirements and shall identify the symbol as joker or faker. Each of these affiliation categories is defined in paragraph 3.2. The codes for affiliation in the symbol ID code are included in appendix B.

TABLE I. Affiliations and battle dimensions.

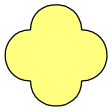
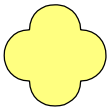
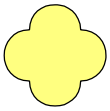
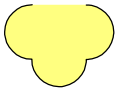
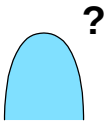
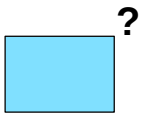
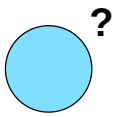
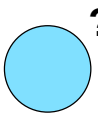
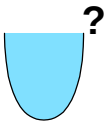
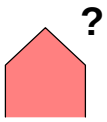
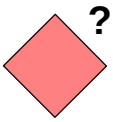
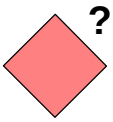
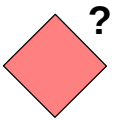
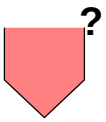
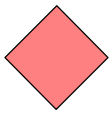
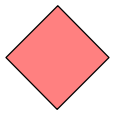
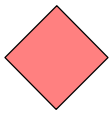
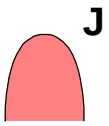
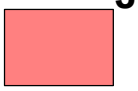
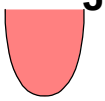
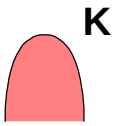
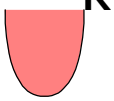
BATTLE DIMENSION / AFFILIATION	AIR/SPACE	SURFACE			SUBSURFACE
		LAND		SEA SURFACE	
		UNITS	EQUIPMENT		
PENDING (YELLOW)					
UNKNOWN (YELLOW)					
ASSUMED FRIEND (CYAN)					
FRIEND (CYAN)					
NEUTRAL (GREEN)					
SUSPECT (RED)					

TABLE I. Affiliations and battle dimensions (cont'd).

BATTLE DIMENSION / AFFILIATION	AIR/SPACE	SURFACE			SUBSURFACE
		LAND		SEA SURFACE	
		UNITS	EQUIPMENT		
HOSTILE (RED)					
JOKER (RED)					
FAKER (RED)					

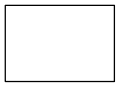
Notes: 1) Frames displayed with solid lines, as shown above, indicate status as present, i.e. position is as provided.
2) Frames in the above table shall be displayed with a dashed outline border to represent a planned or anticipated position status.

5.3.1.2 Battle dimension. Battle dimension defines the primary mission area for the warfighting object within the battlespace. An object can have a mission area above the earth's surface (i.e., in the air or outer space), on the earth's surface, or below the earth's surface. If the mission area of an object is on the earth's surface, it can be either on land or sea. The land dimension includes those mission areas on the land surface or close to the surface (e.g., land mines and underground shelters), whereas the sea surface dimension includes only those objects whose mission area is on the sea surface. The subsurface dimension includes those objects whose mission area is below the sea surface (e.g., submarines and sea mines). The codes for battle dimension in the symbol ID code are presented in appendix B. To clarify which battle dimension should be used for a given object, maritime surface units shall be depicted in the sea surface dimension, aircraft shall be depicted in the air/space dimension, and ground equipment shall be depicted in the land dimension. An aircraft or an aircraft unit that is comprised of aircraft only, regardless of service ownership, shall be depicted in the air dimension. For example, an Army or Marine helicopter squadron is a maneuvering unit (i.e., a unit whose ground support assets are included) and is represented in the land dimension. Likewise, a landing craft whose primary mission is ferrying personnel or equipment to and from shore is a maritime unit and is represented in the sea surface

dimension. However, a landing craft whose primary mission is to fight on land is a ground asset and is represented in the land dimension. As shown in table I, a closed frame shall be used to denote the land and sea surface dimension, a frame open at the bottom to denote the air/space dimension, and a frame open at the top to denote the subsurface dimension.

5.3.1.3 Status. Status refers to whether a warfighting object exists at the location identified (status is "present") or will in the future reside at that location (status is "planned or anticipated"). The symbol frame will be a solid line when indicating present status and a dashed line when indicating anticipated or planned status (see table II). Planned status cannot be shown when the symbol is unframed or is displayed as a dot (see 5.6.1). The codes for status in the symbol ID code are provided in appendix B.

TABLE II. Present and planned status.

BATTLE DIMENSION	AIR/SPACE	SURFACE			SUBSURFACE
		LAND		SEA SURFACE	
STATUS		UNITS	EQUIPMENT		
PRESENT POSITION (P)					
ANTICIPATED OR PLANNED (A)					

5.3.2 Fill. If color is used in a symbol, it shall indicate affiliation. In framed symbols, color shall provide a redundant cue with regard to affiliation. In unframed symbols, color shall be the sole indicator of affiliation, excluding text modifiers. Table C-II defines the default colors that shall be used to designate affiliation when colored symbols are either hand-drawn or displayed electronically. This standard allows deviations from the default when systems require the capability to make distinctions among multiple types of forces, equipment, boundaries, etc. (e.g., to differentiate among coalition forces assigned a friend affiliation).

5.3.3 Icon. In order to decide on the common warfighting symbology in this standard, it was necessary to identify the full range of C4I information required by the warfighter at the command level. The taxonomy used in this standard was adapted from one presented in STANAG 4420 and then extended to address information related to ground units. Due to the fact that the

taxonomy was organized hierarchically, the detailed information it contained provided a logical structure from which to generate a set of icons representing warfighting objects. The information hierarchy is presented in appendix A, and the mapping of warfighting icons to the hierarchy is included in appendix D. The icons in appendix D shall be used whenever a system displays any of the warfighting objects for which an icon is provided. Not all information about objects can be related to a specific affiliation or battle dimension; therefore, it is possible to have an object represented by an icon alone. Appendix D indicates whether an icon shall be framed or unframed or whether framing is optional. Military ships, both sea surface and subsurface, military aircraft, military units, and installation icons are always associated with an affiliation and battle dimension and so shall be framed. Only those icons specifically identified as unframed or frame optional shall be displayed without a frame.

5.4. Tactical graphics. Tactical graphics include tasks, control measures, points, lines, areas, aviation maneuver graphics, deception graphics, offense maneuver graphics, special maneuver graphics, mobility/survivability, fire support graphics, combat service support, command and control, and operations other than war, and can be combined with icons and symbol modifiers to display operational information. The definition and placement of tactical graphics are addressed in appendix E. The graphics in this appendix shall be used whenever a system displays any of the operational information for which a graphic is provided. Default color for tactical graphics will be black or white, depending on display background.

5.5 Symbol modifiers. The field title, description, and maximum length of allowable modifiers are presented in table III, and the default placement of modifiers in fields around the symbol or tactical graphic is shown in figures 3a through 3c. Figure 3a addresses units, installations, and equipment; the placement of modifiers in this figure applies to all units regardless of battlespace dimension. Figure 3b applies to points, areas, lines, and boundaries. Figure 3c addresses NBC events. In figure 3b, certain fields can be displayed more than once within a graphic. The unnumbered fields should be filled before the numbered fields, (i.e., fields W, H, and T should be used before fields W1, H1, and T1). As indicated in table III, not all modifiers are applicable to all symbols or graphics. However, when any modifier is displayed, it shall be defined in accordance with the contents of this table and positioned in accordance with figures 3a through 3c. When transmitted to other systems, symbols and their modifiers can be exchanged using the USMTF GRAPHREP Message.

TABLE III. Symbol modifier field definitions.

Field	Field Title	Description	Units	Equipment	Installations	Points	Areas	Lines	Boundary Lines	Nuclear	Bio	Chem	Field Type
A	Symbol Indicator	Area occupied by frame, fill, and icon	G	G	G	G	G	G	G	G	G	G	G
B	Size Indicator	A symbol that denotes the size of a unit (see table B-II) and nuclear detonation (in kilotons)	10	2	G	-	-	-	10	6	-	-	T/G
C	Quantity of Equipment	Indicates number of items present	-	9	-	-	-	-	-	-	-	-	T
D	Task Force Indicator	A bracket placed over the Size Indicator to denote a Task Force (see figure 3a and figure 4)	G	-	-	-	-	-	-	-	-	-	G
E	Suspect, Assumed Friend, Faker, Joker	**Question mark (?):** Suspect, Assumed Friend, **"J"**: Joker, **"K"**: Faker	1	1	1	-	-	-	-	-	-	-	T
F	Reinforced or Detached	(+) for reinforced, (-) for reduced, (±) reinforced and reduced	3	-	-	-	-	-	-	-	-	-	T
G	Staff Comments	Free text	20	20	20	-	-	-	-	-	-	-	T
H	Additional Information	Free text	20	20	20	20	20	-	-	20	20	20	T
J	Evaluation Rating	One letter and one number (see Note b below)	2	2	2	-	-	-	-	-	-	-	T
K	Combat Effectiveness	**Unit:** effectiveness **Installations:** capability	5	-	5	-	-	-	-	-	-	-	T
L	Signature Equipment	! for detectable electronic signatures (hostile equipment only)	-	1	-	-	-	-	-	-	-	-	T

TABLE III. Symbol modifier field definitions (cont'd).

Field	Field Title	Description	Units	Equipment	Installations	Points	Areas	Lines	Boundary Lines	Nuclear	Bio	Chem	Field Type
M	Higher Formation	Number or title of higher echelon command (corps are designated by Roman numerals)	21	-	-	-	-	-	-	-	-	-	T
N	Hostile (Enemy)	**Equipment, lines, areas, and boundaries:** indicate hostile by letters "ENY"	-	3	-	-	3	3	3	-	-	-	T
P	IFF/SIF	Identification modes and codes	5	5	5	-	-	-	-	-	-	-	T
Q	Direction of Movement Indicator	**Units, equipment, installations:** direction object is moving or will move **Nuclear:** downwind direction	4	4	4	-	-	-	-	4	4	4	T/G
R	Mobility Indicator	Pictorial representation of mobility	-	G	-	-	-	-	-	-	-	-	G
S	Headquarters Staff indicator/location offset indicator	Identifies unit as a headquarters or used to indicate location or to de-clutter	G	G	G	-	-	-	-	-	-	-	G
T	Unique Designation	An alphanumeric title that uniquely identifies a particular symbol; track number **Nuclear:** delivery unit (missile, aircraft, satellite, etc.)	21	21	21	-	-	-	35	15	-	-	T
V	Type of Equipment	**Equipment:** Identifies class or type rather than unique designation **Nuclear:** Weapon type	-	24	-	-	-	-	-	20	-	-	T
W	Date/Time Group (DTG)	Alphanumeric field for date/time (DDHHMMSSZMONYY) (MIL-STD-2500)	14	14	14	14	14	14	-	14	14	14	T

TABLE III. Symbol modifier field definitions (cont'd).

Field	Field Title	Description	Units	Equipment	Installations	Points	Areas	Lines	Boundary Lines	Nuclear	Bio	Chem	Field Type
X	Altitude/Depth	Altitude portion of GPS; Flight level for aircraft. Depth for submerged objects; Height in feet of equipment or structures on the ground	6	6	6	-	-	-	-	6	6	6	T
Y	Location	Latitude and longitude	19	19	19	19	19	19	19	19	19	19	T
Z	Speed	Speed (refer to MIL-STD-6040 for abbrevations)	8	8	8	-	-	-	-	-	-	-	T
AA	Special C^2 headquarters	Name of a special C^2 headquarters	9	-	-	-	-	-	-	-	-	-	T/G
AB	Feint/Dummy indicator	Bracket placed over a unit to show that it is a feint or dummy unit	G	G	G	-	-	-	-	-	-	-	G

Footnote: a. Dash (-) inside boxes indicates nonapplicable.

b. Field J, Evaluation Rating: RELIABILITY RATINGS: **A**-completely reliable, **B**-usually reliable, **C**-fairly reliable, **D**-not usually reliable, **E**-unreliable, **F**-reliability cannot be judged. CREDIBILITY RATINGS: **1**-confirmed by other sources, **2**-probably true, **3**-possibly true, **4**-doubtfully true, **5**-improbable, **6**-truth cannot be judged. The scale 1 to 6 does not represent progressive degrees of accuracy. Recognition must be given to the rating represented by the numeric symbol. Although both letters and numerals are used to indicate the evaluation of an item of information, they are independent of each other. (See FM 34-3, Intelligence Analysis, March 1990, pages 2-13 through 2-17 for complete definitions of evaluation ratings.)

c. Field Type: T = text; G = graphic.

d. Field Y: WGS - 84 is a mandated standard (MIL-STD 2401) which allows an unambiguous representation of positional information. Many mapping, charting, and geodetic products produced by other agencies and governments are not referred to the WGS - 84. Parameters to transform these products to WGS - 84 are part of this standard.

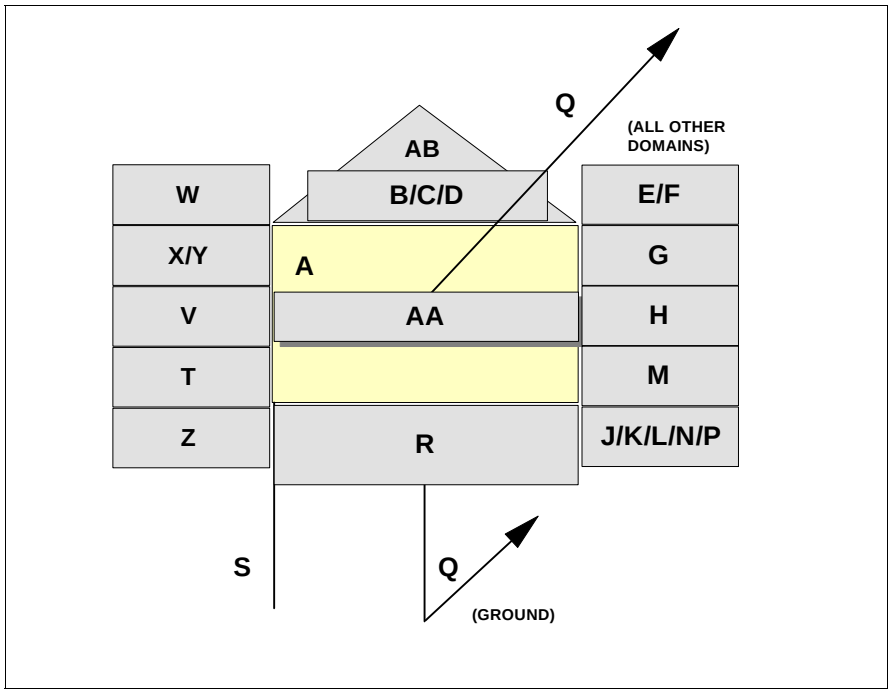


FIGURE 3a. Field positions for units, installations, and equipment.

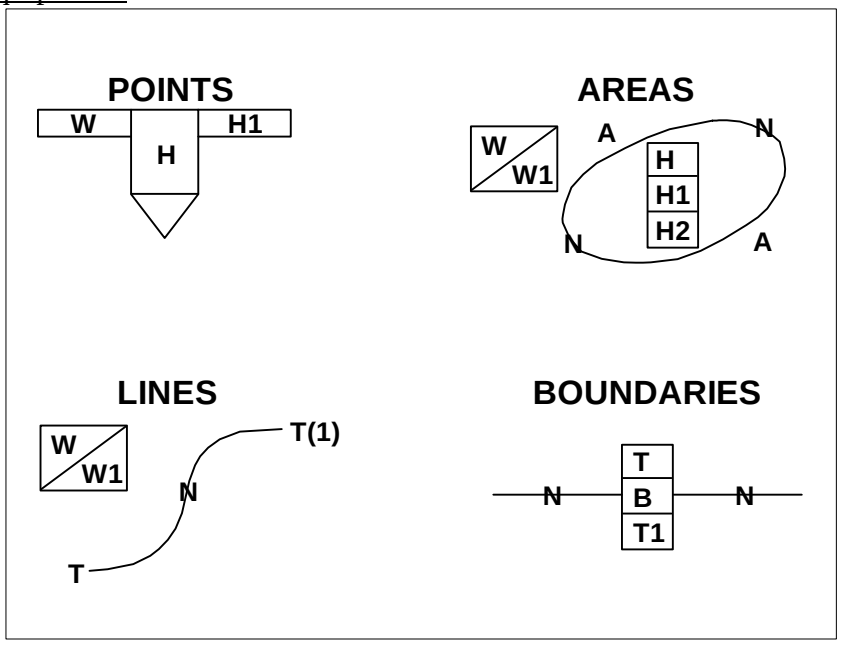


FIGURE 3b. Placement of modifiers for points, areas, lines and boundaries.

Note: For lines, field T is the line designator (see table E-1) along with the designated line name if available.

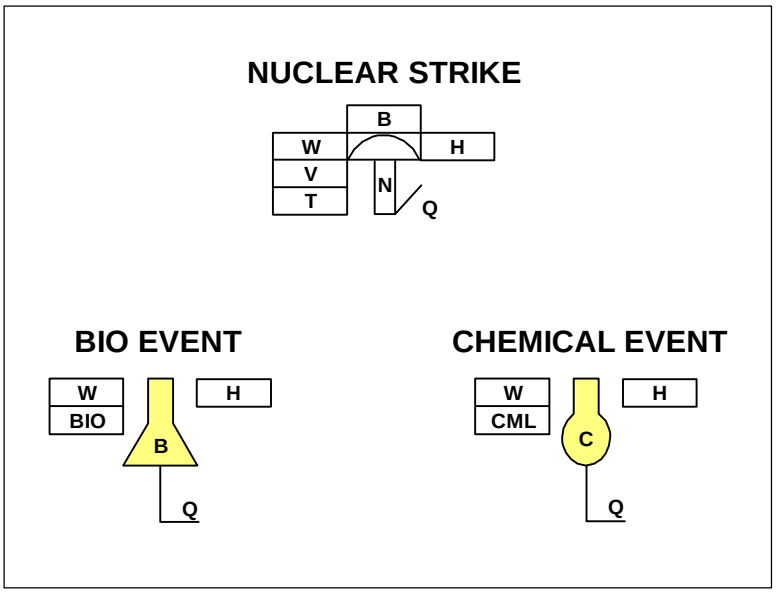


FIGURE 3c. Placement of modifiers for NBC events.

Note:

(1) NBC fields are defined in table III.
(2) See table D-I for icon information.
(3) See table C-II for default color presentation.

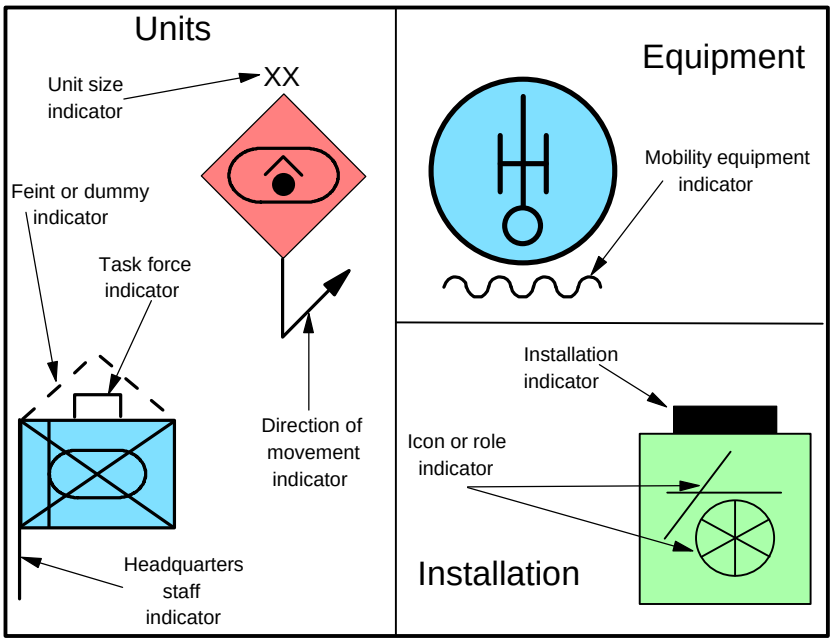


FIGURE 4. Symbol modifiers.

5.5.1 Indicators. Indicators can be used with both framed and unframed symbols and with tactical graphics. An example of each type of symbol modifier is given in figure 4. Implementation guidance, where available, is provided in appendix C.

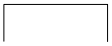
5.5.1.1 Direction of movement. The direction of movement indicator is an arrow or staff identifying the direction of movement or intended movement of an object. This indicator is identified as field Q in table III and positioned as shown in figures 3a, 3c, and 4. For land symbols, the indicator is a bent arrow extending downward from the bottom center of the frame or icon and pointing in the direction of movement (see figures 3a and 4). For all other symbols, the indicator is an arrow extending from the center of the frame or icon and pointing in the direction of movement (see figure 3a). For NBC events, the indicator is one or two lines indicating the downwind direction (see figure 3c).

5.5.1.2 Size/mobility. The size indicator provides a graphic representation of size, as shown in table IV. It is identified as field B in table III and positioned as shown in figures 3a, 3c, and 4. Size indicators are also used in tactical graphics, as discussed in appendix E. Indicator codes for size are listed in appendix B. The mobility indicator indicates the mobility of an object, as shown in figure 4, and is used for equipment only. This indicator identifies mobility other than that intrinsic to the equipment itself. For example, the symbol for a self-propelled howitzer moving by train would include a railway mobility indicator, while the symbol for a tank or other tracked vehicle would not contain any mobility indicator. The mobility indicator is identified in field R of table III and depicted as shown in figures 3A and 4.

TABLE IV. Size indicator.

Indicator	Description
∅	Team/Crew
•	Squad
••	Section
•••	Platoon/Detachment
I	Company/Battery/Troop
I I	Battalion/Squadron
I I I	Regiment/Group
X	Brigade
X X	Division
X X X	Corps
X X X X	Army
X X X X X	Army Group/Front
X X X X X X	Region

TABLE V. Status indicators.

Indicator	Description
	Installation
	Task Force
	Feint/Dummy
	Headquarters staff

5.5.1.3 Headquarters staff. The headquarters staff indicator identifies a unit as a headquarters. The indicator is a line extending downward from the left side of the frame. This indicator is identified as field S in table III and positioned as shown in figures 3a and 4. The indicator may be extended in special circumstances to indicate a new or newly named C2 headquarters. This special indicator is identified as field AA and positioned as shown in figure 5.

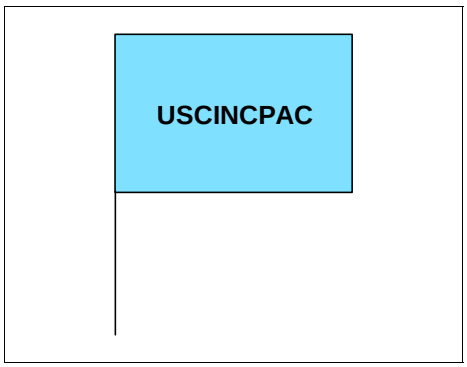


FIGURE 5. Special C^2 headquarters symbol.

5.5.1.4 Task force. The task force indicator identifies units as a task force. It is represented by a bracket in field B as shown in figures 3a and 4. Task force codes are provided in appendix B.

5.5.1.5 Location. Objects shall be located in accordance with paragraph 5.6.3. The location offset indicator is used when placing an object away from its actual location. This indicator is a line extending downward from the left side of a frame or icon, with the end point of the line indicating the location of the symbol. This indicator is identified as field S in table III and positioned as shown in figures 3a and 4. Actual location (field Y) is given in latitude and longitude.

5.5.1.6 Feint/dummy. The feint or dummy indicator identifies an offensive unit intended to draw the enemy's attention away from the area of the main attack. The indicator is depicted in figure 4 and represented in field AB.

5.5.2 Text. Table III defines the specific content of each text-based symbol modifier. Air/space and sea track numbers are included in field T and positioned as shown in figures 3a through 3c. Staff comments and additional information are contained in fields G and H, with the content of these fields being implementation-specific so long as the maximum number of characters in each field is not exceeded.

5.6 Display. The following rules relate to the construction of warfighting symbology and apply to those display requirements necessary to achieve interoperability in joint service operations. Additional guidance concerning symbology implementation is provided in appendix C.

5.6.1 Symbol display options. C4I systems differ in their operational requirements concerning the amount of information about a warfighting object that needs to be displayed. As a result, this document standardizes those symbology elements required to achieve interoperability in information presentation, but allows flexibility in the symbol components and modifiers that are displayed to the warfighter. Display options available range from complex (i.e., symbols include frame, fill, and icon) to primitive (i.e., symbols rendered as dots that denote the presence of an object at a specific location). Table V provides examples of display options that can be used in color and monochrome displays and can either be hand-drawn or computer-generated. Systems can select one or more display options for implementation based on operational requirements and display capabilities. If multiple options are available, the warfighter may be allowed to choose a single option for rendering all symbols or to select different options based on the affiliation or battle dimension of the object and the amount of information required. For example, the warfighter may choose to display minimal information about friendly objects (displaying these symbols as dots) and maximal information about potential threats (displaying these symbols with frame, fill, and icon).

5.6.2 Arrangement of symbol modifiers. When symbol modifiers are displayed, the symbol itself should be centered within field A (see figure 3a), and the position of all modifiers should remain the same whether the symbol is framed or unframed. While the relative placement of the fields should be maintained, implementation and size constraints within a system may require fields to be offset or not displayed. Text modifiers placed to the left of the symbol should be right justified, and text placed to the right should be left justified. When multiple text modifiers are

displayed in a single field (e.g., E/F or J/K/L/N/P), they shall be ordered as shown in figure 3a and separated by a single space, and the spaces assigned to unused modifiers shall be collapsed to bring the text as close to the symbol as possible. Text modifiers placed above the symbol should be bottom justified and centered. Text below a symbol should be top justified and centered.

5.6.3 Plotting. The plotting of symbols shall be based on the object's geometric center. The geometric center indicates the general vicinity of the center of mass of an object. If a location offset indicator is displayed with a symbol, the base of the indicator shall indicate the object's location. If a group of objects is displayed at one location, the group may be enclosed with a bracket and the location of that group identified with a location indicator. Other display options for reducing clutter when symbols overlap or are co-located are considered to be implementation-specific. The positional accuracy of symbology plotting is also considered implementation-specific.

5.6.4 Symbol orientation. The frame and icon in framed symbols shall be displayed in the orientation illustrated in appendix D. Equipment in the land battle dimension can be rotated to face the direction of movement only when the symbol is unframed.

TABLE VI. Example of display option hierarchy.

Display Option Example	Attributes
	Frame: ON (black or white depending on background) Fill: ON (use default color indicating affiliation) Icon: ON (black or white)
	Frame: ON (use default color indicating affiliation) Fill: OFF Icon: ON (use default color indicating affiliation)
	Frame: ON (black or white depending on background) Fill: OFF Icon: ON (black or white) Comments: Default option for monochrome implementation; replace black/white with the colors available in this implementation.
	Frame: OFF (none) Fill: OFF Icon: ON (use default color indicating affiliation)

TABLE VI. Example of display option hierarchy.

Display Option Example	Attributes
	Frame: ON (use default color indicating affiliation) Fill: OFF Icon: OFF (none)
	Frame: ON (monochrome system) Fill: OFF Icon: OFF (none)
	Frame: OFF (none) Fill: ON (use default color indicating affiliation) Icon: OFF (none)
	Frame: OFF (none) Fill: OFF (none) Icon: OFF (none) Comments: Use only to indicate location of symbol.